Remarks

Claims 22-43 were pending in the subject application. By this Amendment, claims 22 and 36 have been amended, claims 37 and 40-43 have been canceled, and new claim 44 has been added. No new matter has been introduced. Support for the amendments to the claims can be found throughout the original specification (see, for example; page 10, line 17 through page 11, line 7; original claim 22; and Figures 1 and 2). Accordingly, claims 22-36, 38, 39, and 44 are before the Examiner for consideration.

The amendments to the claims have been made in an effort to lend greater clarity to the claimed subject matter and to expedite prosecution. The amendments should not be taken to indicate the applicants' agreement with, or acquiescence to, the rejection of record. Favorable consideration of the claims now presented, in view of the remarks and amendments set forth herein is earnestly solicited.

Claims 22-26, 34, 35, and 41-43 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Bakajin *et al.* (U.S. Patent No. 7,290,667) in view of Mayer *et al.* (U.S. Patent No. 6,763,710) and Tipler *et al.* (U.S. Patent No. 6,652,625). The applicants respectfully request reconsideration.

By this Amendment, claim 22 has been amended to emphasize that "the miniaturized device for the storage and/or enrichment comprises a silicon wafer wherein an inlet opening and an outlet opening are incorporated into said silicon wafer, further comprising a PECVD layer of a filling material deposited onto said silicon wafer, further comprising a PECVD layer consisting of amorphous carbon covering said filling material layer, said inlet opening and said outlet opening, thus forming a channel-like chamber comprising the filling material, wherein said inlet opening and said outlet opening are both connected via a connection to the chamber thus forming an inlet and an outlet for the delivery and extraction of a sample of molecules or atoms." These advantageous features are described at, for example, page 10, line 17 through page 11, line 7 of the subject specification. Also, claim 36 has been amended to recite the step of "providing a silicon substrate and forming an inlet opening and an outlet opening in said substrate," and to clarify that Plasma Enhanced Chemical Vapor Deposition (PECVD) is used for deposition of the filling material and the

amorphous carbon cover and that the inlet and outlet openings can be used to connect the channel to the outside world.

Bakajin *et al.* disclose a mircofluidic sieve wherein, a chamber is formed by bonding a Pyrex cover lid to the top surface of the substrate, as shown in Figures 1D and 2. In the Bakajin device, the cover **15** or **25** is directly bonded to the substrate. There is no discussion whatsoever in the Bakajin *et al.* reference of any bonding forces to the filling **14** of the chamber.

Mayer *et al.* disclose a flow sensor having a semiconductor substrate **5** with a recess or opening **13**, and the recess or opening **13** is covered by a membrane **12** (see, e.g., Figure 3 and column 2, lines 53-60). Though Mayer *et al.* teach that the cover layer **15** can be formed of diamond-like carbon, this cover layer **15** is not disclosed to cover an opening in the substrate **5**. Instead, the cover layer **15** chemically separates the whole measuring section **6** from the liquid **1**. Thus, the cover layer **15** of Mayer *et al.* is not directly attached to any filling material, nor does it cover an opening in the substrate; rather, the cover layer **15** serves as a chemically separating layer arranged on the membrane itself.

According to the subject invention, a different design of an enrichment device is disclosed. The applicants would like to emphasize that the claimed gas chromatograph comprises a miniaturized device including a silicon wafer with an inlet opening and an outlet opening incorporated therein. Directly on the substrate, a filling layer is disposed which is defined as being thin due to the use of a PECVD technique. In addition, a cover layer of amorphous carbon is directly disposed onto the filling layer as a PECVD layer to cover the filling layer. The cover layer also covers the inlet and the outlet openings of the substrate, thereby forming the channel-like chamber which is filled by the filling material (see, e.g., Figures 1 and 2 of the subject specification).

Thus, the cover layer is directly applied to the filling material and directly covers the inlet and the outlet opening, thereby forming a delimiting wall section of the chamber. The chamber is therefore defined by the substrate on one side and the amorphous carbon layer on the other side. This is in contrast to the teachings of Bakajin *et al.* and Mayer *et al.* In the Bakajin *et al.* reference, the chamber is delimited by the substrate and the Pyrex cover lid, and in the Mayer *et al.* reference,

the channel is formed between the semiconductor substrate **5** and the membrane **12**. Neither reference teaches a PECVD cover layer of amorphous carbon arranged in such a way as to delimit a channel-like chamber. In particular, Mayer *et al.* disclose that the diamond-like carbon layer is to be applied to the separating measuring section **6** as a whole, namely applied to the membrane on the outer side of the chamber and/or the resistive heating **R1** and the two temperature sensors **10**, **11**. Moreover, the Tipler *et al.* reference is totally silent about the set-up and design of an enrichment device and in particular does not address a set-up of such a chamber using a substrate, a filling material, and a cover layer.

As discussed above, the combination of cited references fails to teach or suggest the specific arrangement of the claimed invention. Moreover, the applicants respectfully submit that a skilled artisan would not have had a reason to modify the Bakajin-Mayer-Tipler device to arrive at the claimed invention.

Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a) based on Bakajin *et al.*, Mayer *et al.*, and Tipler *et al.*

Claims 27-33 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Bakajin *et al.* in view of Mayer *et al.* and in view of Tipler *et al.* as applied to claims 22-26, 34, 35, and 41-43, and further in view of Gordon (U.S. Patent No. 5,954,860). The applicants respectfully request reconsideration.

The deficiencies of the combination of Bakajin *et al.*, Mayer *et al.*, and Tipler *et al.* have been discussed above. Gordon does not cure, or even address, these deficiencies.

Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a) based on Bakajin *et al.*, Mayer *et al.*, Tipler *et al.*, and Gordon.

Claims 36-40 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Bakajin *et al.* in view of Bailey *et al.* (U.S. Patent No. 5,569,501) and in view of Tipler *et al.* The applicants respectfully request reconsideration.

By this Amendment, claim 36 has been amended to recite the step of "providing a silicon substrate and forming an inlet opening and an outlet opening in said substrate," and to clarify that PECVD is used for deposition of the filling material and the amorphous carbon cover and that the

inlet and outlet openings can be used to connect the channel to the outside world. The combination of cited references fails to teach or suggest the advantageous method of claim 36 as currently presented.

According to the subject invention, the process for the production of a miniaturized gas chromatograph includes providing a silicon substrate and forming an inlet opening and an outlet opening in said substrate. At least one layer of filling material is deposited on the silicon substrate using PECVD, and the PECVD layer is covered with at least one layer of amorphous carbon using PECVD. The layer of filling material and the layer of amorphous carbon are deposited in such a way onto the carrier that a channel is formed between the carrier and the layer of amorphous carbon, such that the channel contains the filling material, and the inlet and outlet openings can be used to connect the channel to the outside world.

As discussed above, Bakajin *et al.* disclose a mircofluidic sieve wherein, a chamber is formed by bonding a Pyrex cover lid to the top surface of the substrate, as shown in Figures 1D and 2. In the Bakajin device, the cover **15** or **25** is directly bonded to the substrate. There is no discussion whatsoever in the Bakajin *et al.* reference of any bonding forces to the filling **14** of the chamber.

There is no teaching or suggestion in the combination of cited references, including Bailey *et al.* and Tipler *et al.*, of the advantageous process of claim 36. For example, there is no discussion of providing a silicon substrate and forming an inlet opening and an outlet opening in said substrate. Moreover, the applicants respectfully submit that a skilled artisan would not have had a reason to modify the Bakajin-Bailey-Tipler process to arrive at the claimed invention.

Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a) based on Bakajin *et al.*, Bailey *et al.*, and Tipler *et al.*

In view of the foregoing remarks and the amendment above, the applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account No. 19-0065.

The applicants also invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephone interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,

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Attachment: Request for Continued Examination